DRILTEK
PROFESSIONAL OPERATIONS MANAGEMENT

January 6, 2022

Frontline Bio Energy
Attention: Gregory Schnaar

Transmitted via email

RE: U.S. EPA Region IX, Class VI Injection Project – Kern County, California

Greg,

Please see the attached well stimulation plans that you requested for your proposed Vedder CO_2 sequestration project located in Kern County, California.

Thank you,

Lane H. Linthicum
Chief Operating Officer
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Well Stimulation Program

Well stimulation may be required to realize the full injectivity potential of a well. Per 40 CFR 146 the following is required for a well stimulation.

Well stimulation can mean, but is not limited to, processes used to clean the well bore, enlarge channels, and increase pore space in the interval to be injected thus making it possible for injectate to move more readily into the formation, and includes (1) surging, (2) jetting, (3) blasting, (4) acidizing, (5) hydraulic fracturing.

All stimulation programs must be approved by the Director as part of the permit application and incorporated into the permit.

Owners or operators must notify the Director in writing 30 days in advance of any planned stimulation activities.

Stimulation programs require a description of stimulation fluids to be used and a determination that stimulation will not interfere with containment.

A detailed stimulation procedure will be developed if injectivity is lower than expected. Example summary acid and fracture stimulation procedures are provided on the following pages as part of the permit application process.

Injection Well Acid Stimulation

Objective: Remove formation and near wellbore damage via acid stimulation.

Summary Damage Remediation Procedure:

1. Obtain necessary permits for well work.
2. Verify casing and tubing integrity.
3. Function test wellhead valves prior to stimulation.
4. Obtain fluid injection rate and pressure data for last six months leading up to stimulation.
5. Design stimulation and inhibitors based on actual injection rate and pressure data.
6. Obtain any scale, fill, sludge and emulsion samples from sample points, surface filters, and downhole, if possible. Test samples with proposed acid blends and adjust acid blend according to test results
7. Rig up stimulation equipment. Pressure test injection lines to 80% of maximum working pressure.
8. Establish injection down tubing with inert fluid.
9. Stimulate well with 15 gallons of 15% HCL acid per foot of perforations followed by 30 gallons of 12 % HCL / 3% HF acid per foot of perforations.
    - Do not exceed maximum permitted injection pressure during stimulation
    - Apply 500 psi pressure to well casing and monitor pressure during stimulation
    - Acid, additives, and inert fluid are subject to change based on well data
10. Flush acid with 45 gallons of inert fluid (5% NH4Cl water) per foot of perforations plus injection tubing string volume.
    - Do not exceed maximum permitted injection pressure during stimulation
    - Apply 500 psi pressure to well casing and monitor pressure during stimulation
    - Acid, additives, and inert fluid are subject to change based on well data
11. Isolate stimulation equipment from wellhead.
12. Rig down stimulation equipment.
13. Resume injection.

CO_2 injectate may be blended with acid while acid is being pumped to facilitate better stimulation of all perforations down hole. This is commonly referred to in industry as a “foamed” acid stimulation.

If fluid is unable to be injected at an effective rate acid may be placed directly opposite perforations down hole using a through-tubing coiled tubing unit or with tubing and a packer via direct well intervention.

The same pressure and volume restrictions should apply to any method of acid stimulation: Do not exceed maximum permitted injection pressure while acidizing.

Proposed Wellbore Schematic (Acid Stimulation)

CO2 Injection Well
Single Injection Zone
Vedder 3

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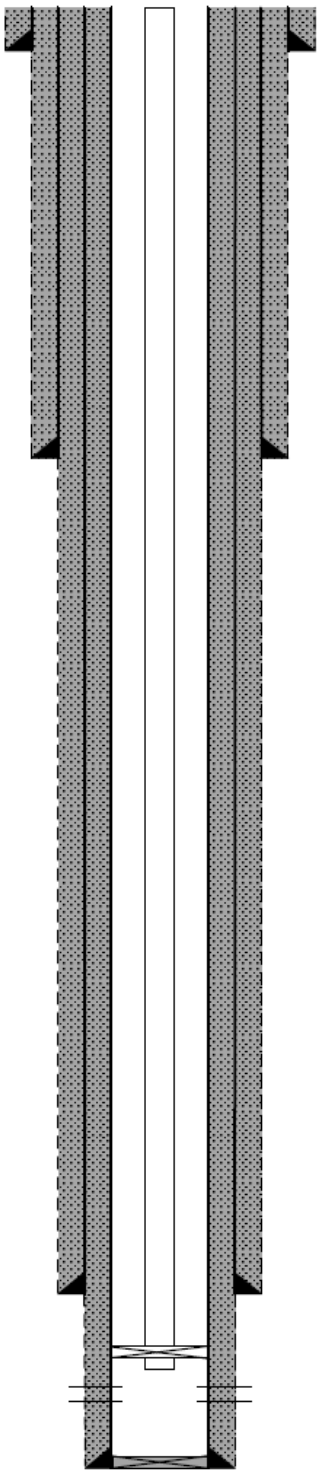
Geo Marker	INCL/TVD	Hole		Casing & Perf	Details
				Depths are MD	
		26"		20" 94# J-55 BTC Csg @ 250'	20" Csg cmt'd @ 250'-Surf w/ 489 CF cmt
		17-1/2"			
BFW @ ~1750'					
USDW @ ~2495'				13-3/8" 61# J-55 BTC Csg @ 2600'	13-3/" Csg cmt'd @ 2600'-Surf w/ 2377 CF cmt
		12-1/4"			
				9-5/8" 53.5# N-80 LTC Csg @ 7700'	9-5/8" Csg cmt'd @ 7700'-Surf w/ 3207 CF cmt
Pyramid Hills @ 7775' Vedder 1 @ 7789' Vedder 2 @ 8040'					7" Packer @ 8100' 2-7/8" IC Cr13 Tbg @ 8150'
Vedder 3 @ 8167' Vedder 4 @ 8344'		8-1/2"		Perforated @ 8167'-8255' (V3)	
		TD @ 8700'		7" 29# L-80 Cr13 LTC Csg @ 8700'	7" Csg cmt'd @ 8700'-Surf w/ 1166 CF cmt w/ latex additive in tail

Injection Well Fracture Stimulation

Objective: Bypass near wellbore damage via fracture stimulation

Summary Stimulation Procedure:

1. Determine the need for stimulation utilizing available injection and formation data.
2. Model extent of stimulation utilizing all available data to confirm no loss of containment.
3. Obtain necessary permits for well work.
4. Verify casing and tubing integrity.
5. Remove injection tubulars from wellbore (if installed).
6. Install tubulars and isolation equipment for fracture stimulation.
    - Working pressure to be 115% of maximum anticipated surface pressure
7. Install wellhead equipment for fracture stimulation.
    - Working pressure to be 115% of maximum anticipated surface pressure
    - Pressure test surface wellhead equipment to 115% of maximum anticipated surface pressure
8. Mobilize stimulation service provider. Rig up stimulation equipment.
9. Test all pressure pumping equipment and injection lines to 115% of maximum anticipated surface pressure.
    - Monitor pressure on all available casing strings of well during stimulation
10. Stimulate well per approved, permitted design.
    - Example stimulation design: 100,000 lbs 20/40 resin coated proppant placed with 10,000 bbl 30 lb/mgal borate crosslinked gel
    - Stimulation design will vary based on actual data gathered from well drilling, logging, coring, completion, and injection
11. Isolate and bleed pressure from stimulation equipment.
12. Rig down stimulation equipment.
13. Cleanout wellbore, if necessary.
14. Remove tubulars and isolation equipment for fracture stimulation, if necessary.
15. Install injection tubulars, isolation equipment, and monitoring equipment, if necessary.
16. Resume injection.

Proposed Wellbore Schematic (Fracture Stimulation)

CO2 Injection Well
Single Injection Zone
Vedder 3

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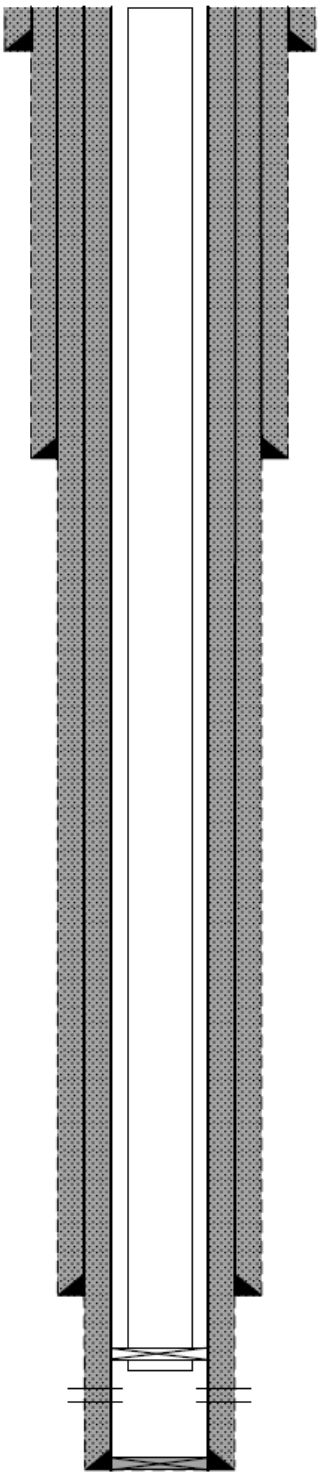
Geo Marker	INCL/TVD	Hole		Casing & Perf	Details
				Depths are MD	
		26"		20" 94# J-55 BTC Csg @ 250'	20" Csg cmt'd @ 250'-Surf w/ 489 CF cmt
		17-1/2"			
BFW @ ~1750'					
USDW @ ~2495'				13-3/8" 61# J-55 BTC Csg @ 2600'	13-3/" Csg cmt'd @ 2600'-Surf w/ 2377 CF cmt
		12-1/4"			
				9-5/8" 53.5# N-80 LTC Csg @ 7700'	9-5/8" Csg cmt'd @ 7700'-Surf w/ 3207 CF cmt
Pyramid Hills @ 7775' Vedder 1 @ 7789' Vedder 2 @ 8040'		8-1/2"			4 ½" Frac String surface - 8100' 7" Packer @ 8100'
Vedder 3 @ 8167' Vedder 4 @ 8344'				Perforated @ 8167'-8255' (V3)	
		TD @ 8700'		7" 29# L-80 13 CR Csg @ 8700'	7" Csg cmt'd @ 8700'-Surf w/ 1166 CF cmt